

*Revised
9/10/74
B. G. T.*

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF RESEARCH ADMINISTRATION
RESEARCH PROJECT INITIATION

Date: September 10, 1974

Project Title: **The Chemistry of N - Sulfonylamines and Thioamines**

Project No: **G-33-685**

Principal Investigator **Dr. Edward M. Burgess**

Sponsor: **American Chemical Society, Petroleum Research Fund**

Agreement Period: From 9/1/74 Until 8/31/76

Type Agreement: **Grant No. PRF # 7154-AC1**

Amount: **\$20,000**

Reports Required: **Annual Progress
Final Summary**

Sponsor Contact Person (s):

**Mr. Justin W. Collat
Program Administrator
The Petroleum Research Fund
American Chemical Society
1155 Sixteenth Street, NW
Washington, D. C. 20036**

Assigned to: **Chemistry**

COPIES TO:

Principal Investigator	Library
School Director	Rich Electronic Computer Center
Dean of the College	Photographic Laboratory
Director, Research Administration	Project File
Director, Financial Affairs (2)	
Security-Reports-Property Office <input checked="" type="checkbox"/>	
Patent Coordinator	Other <u> </u>



GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION
SPONSORED PROJECT TERMINATION

Date: FEBRUARY 1, 1977

Project Title: THE CHEMISTRY OF N-SULFONYLAMINES AND THIOAMINES

Project No: G-33-685

Project Director: DR. EDWARD M. BURGESS

Sponsor: AMERICAN CHEMICAL SOCIETY/PETROLEUM RESEARCH FUND

Effective Termination Date: 8/31/76

Clearance of Accounting Charges: 8/31/76

Grant/Contract Closeout Actions Remaining: NONE

- ☐ Final Invoice and Closing Documents
- ☐ Final Fiscal Report
- ☐ Final Report of Inventions
- ☐ Govt. Property Inventory & Related Certificate
- ☐ Classified Material Certificate
- ☐ Other _____

Assigned to: CHEMISTRY (School/Laboratory)

COPIES TO:

Project Director
Division Chief (EES)
School/Laboratory Director
Dean/Director—EES
Accounting Office
Procurement Office
Security Coordinator (OCA) ✓
Reports Coordinator (OCA)

Library, Technical Reports Section
Office of Computing Services
Director, Physical Plant
EES Information Office
Project File (OCA)
Project Code (GTRI)
Other _____

RESEARCH PROGRESS REPORT

Page 1 of 1 pages.

Date November 23, 1976

PRF# 7154-AC1

PRINCIPAL INVESTIGATOR(S)

Edward M. Burgess

Please refer to instructions.

Fill in information requested above for each page.

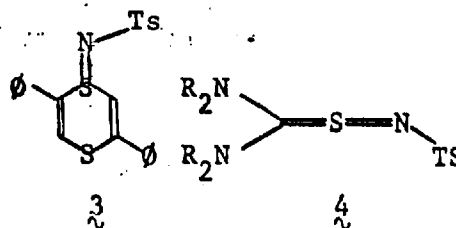
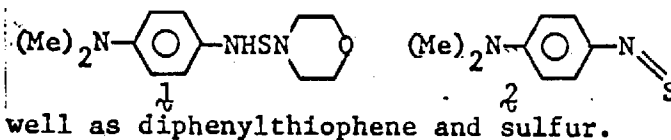
The report heading, narrative, and all drawings must be prepared within the box.

Make copy (Xerox, carbon, etc).

7154-AC1 The Chemistry of N-Sulfonyl-
amines and Thioamines

Edward M. Burgess, Georgia Institute of
Technology

In the area of thioamine (thionitrosamine) synthesis the thermolysis (50°) of 1 gives bis(p-dimethylamino-phenylsulfurdimide) which might proceed via p-dimethylamino-phenylthioamine intermediate (2), however, all attempts to trap this thioamine as a cycloaddent with added alkenes failed. The thermolysis (110°) of 3 gave products derived from toluene sulfonylnitrene as



We have prepared stable thiones-imides of the type 4 and determined the structure by x-ray crystallography of their adducts with dimethylacetylene dicarboxylate which suggests initial cycloaddition across the S-N moiety. In this respect such thione S-imides act as 1,2 rather than 1,3-dipolarophiles.

Recent developments in the synthesis and structure of thione s-methylides have been published (1,2).

- (1) Burgess, E.M., Arduengo, A., J. Amer. Chem. Soc., (1976) 98, 5020.
- (2) Burgess, E.M., Arduengo, A., Amer. Chem. Soc., (1976) 98, 5021.

PERSONNEL STATEMENT

AF# 7154-AC1 REPORTING PERIOD Sept. 1, 1975 TO August 31, 1976

GRANTING INSTITUTION Georgia Institute of Technology DEPARTMENT Chemistry

PRINCIPAL INVESTIGATOR(S) Edward M. Burgess

GRANT PROJECT TITLE The Chemistry of N-Sulfonylamines and Thioamines

List undergraduate, graduate, and postdoctoral co-workers receiving stipends under the above named grant:

NAME	TITLE OR ACADEMIC APPOINTMENT	PREVIOUS EDUCATION & DEGREES*	COUNTRY OF PERMANENT RESIDENCE	PERIOD OF SUPPORT (MONTHS)	PERCENT OF SUPPORT FROM PRF	DEGREES RECEIVED (IF ANY) DURING REPORTING PERIOD
Lee Phone Lin	Postdoctoral	Ph.D./Rice Univ.	Taiwan	12	100%	N/A

List other co-workers on grant project not directly supported with ACS - PRF funds:

NAME	SOURCE OF SUPPORT	DATES ASSOCIATED WITH GRANT PROJECT
Anthony Arduengo	NSF	9-1-75 to 8-31-76

For graduate students, indicate the College or University attended prior to graduate work. For postdoctoral fellows, give the name of the Ph. D. granting institution.

G-33-685

GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GEORGIA 30332

OFFICE OF
THE DIRECTOR OF
FINANCIAL AFFAIRS

October 4, 1977

The Petroleum Research Fund
American Chemical Society
1155 Sixteenth Street, N.W.
Washington, D. C. 20036

Gentlemen:

Enclosed in duplicate is the Annual Financial Statement and Personnel Statement for PRF Number 7154-AC1 covering the period September 1, 1976 through August 31, 1977.

If you have questions or desire any additional information, please let us know.

Sincerely yours,

Evan Crosby^U
Associate Director of
Financial Affairs

EC/bs
Enclosures: as stated
cc: Dr. E. M. Burgess
Dr. J. A. Bertrand
Mr. E. E. Renfro
Mr. A. H. Becker ✓
File G-33-685

AMERICAN CHEMICAL SOCIETY - THE PETROLEUM RESEARCH FUND

for the Period: 9/1/76 to 8/31/77
 (August 31 is the preferred closing date for the reporting period)

Balance Carried Over from Previous Reporting Period (from Same or Earlier Grant)	<u>\$ 12,352.33</u>
Received from PRF During Reporting Period	<u>.00</u>
Salaries to:	
Principal Investigator	<u>.00</u>
(Contribution Toward Summer Salary*)	
Graduate or Undergraduate Students	<u>.00</u>
Postdoctoral Fellows	<u>\$ 1,716.67</u>
	<u>.00</u>
Fellowships or Scholarships to:	
Undergraduate Scholars	<u>.00</u>
Graduate Fellows	<u>.00</u>
Postdoctoral Fellows	<u>.00</u>
Tuition	<u>.00</u>
Materials and Supplies	<u>1,057.66</u>
Equipment	<u>.00</u>
Computer Time Charges	<u>.00</u>
Travel	<u>.00</u>
Other Expenses (Professional Services)	<u>77.00</u>
Departmental Supplement or Allocation*	<u>.00</u>
* If provided in grant agreement	
Total Expenditures During Reporting Period	<u>\$ 2,851.33</u>
Balance on Hand at End of Period	<u>\$ 9,510.00</u>
Total of PRF Grant Payments Received to Date	<u>\$ 20,000.00</u>

Complete this section only for a FINANCIAL STATEMENT which shows a balance in the grant account at the termination date of the current grant agreement.

The balance in the grant account will be liquidated

☐ By refund of unspent and uncommitted funds. The check should be drawn to the order of American Chemical Society - The Petroleum Research Fund, and identified by the number of the grant.

☐ By use in the completion of the grant project. We hereby request approval by the American Chemical Society of an extension of the grant agreement, without commitment of additional funds until _____, (Period up to one year, renewable - insert "Annual" above).

We certify that the expenses reported herein were incurred for education and research in accord with the terms of the approved ACS-PRF grant-in-aid.

Georgia Institute of Technology
 (Grantee Institution)

By Evan Crosby, Associate 10/4/77
 (Financial Officer) Dir. of Financial Affairs (Date)
Edward M. Burgess 9/27/77 7154-AC1
 (Name of Principal Investigator) (PRF No.)

** Please submit IN DUPLICATE to The Petroleum Research Fund,
 American Chemical Society, 1155 Sixteenth Street, N. W.
 Washington, D. C. 20036 **

PERSONNEL STATEMENT

PRF# 7154-AC1 REPORTING PERIOD September 1, 1976 TO August 31, 1977

GRANTEE INSTITUTION Georgia Institute of Technology DEPARTMENT Chemistry

PRINCIPAL INVESTIGATOR(S) Edward M. Burgess

GRANT PROJECT TITLE The Chemistry of N-Sulfonylamines and Thioamines

List undergraduate, graduate, and postdoctoral co-workers receiving stipends under the above named grant:

NAME	TITLE OR ACADEMIC APPOINTMENT	PREVIOUS EDUCATION & DEGREES*	COUNTRY OF PERMANENT RESIDENCE	PERIOD OF SUPPORT (MONTHS)	PERCENT OF SUPPORT FROM PRF	DEGREES RECEIVED (IF ANY) DURING REPORTING PERIOD
Piara Singh	Postdoctoral	Ph.D./SUNY Buffalo	USA	3	100%	N/A

List other co-workers on grant project not directly supported with ACS - PRF funds:

NAME	SOURCE OF SUPPORT	DATES ASSOCIATED WITH GRANT PROJECT

For graduate students, indicate the College or University attended prior to graduate work. For postdoctoral fellows, give the name of the Ph. D. granting institution.

G-33-695

GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GEORGIA 30332

OFFICE OF
THE DIRECTOR OF
FINANCIAL AFFAIRS

March 16, 1977

American Chemical Society
1155 Sixteenth Street, N. W.
Washington, D. C. 20036

Gentlemen:

Enclosed in duplicate is the Annual Financial Statement
for PRF Number 7154-AC1 covering the period September 1, 1975
through August 31, 1976.

If you have any questions or desire additional information,
please let us know.

Sincerely yours,

Evan Crosby
Associate Director of
Financial Affairs

EC/bs
enclosures:

cc: Dr. E. M. Burgess
Dr. J. A. Bertrand
Mr. E. E. Renfro
Mr. A. H. Becker ✓
File G-33-685

ANNUAL FINANCIAL STATEMENT
(Insert "Annual" or "Final", as appropriate)

AMERICAN CHEMICAL SOCIETY - THE PETROLEUM RESEARCH FUND

For the Period: 9/1/75 to 8/31/76
(August 31 is the preferred closing date for the reporting period)

Balance at Start of Reporting Period		<u>9,500.00</u>
Received from PRF During Reporting Period		<u>10,000.00</u>
Salaries to:		
Principal Investigator	-	
(Contribution toward summer salary*)		
Graduate or Undergraduate Students	-	
Postdoctoral Fellows	<u>4,074.99</u>	
Fellowships or Scholarships to:		
Undergraduate Scholars	-	
Graduate Fellows	-	
Postdoctoral Fellows	-	
Tuition	-	
Materials and Supplies	<u>1,382.68</u>	
Equipment	-	
Travel	-	
Other Expenses (Professional Services)	<u>1,190.00</u>	
Institutional Supplement*	<u>(500.00)</u>	
Departmental Supplement or Allocation*	<u>1,000.00</u>	
* If provided in grant agreement		
Total Expenditures During Reporting Period	<u>7,147.67</u>	
Balance on Hand at End of Period		<u>12,352.33</u>
Total of PRF Grant Payments Received to Date		<u>20,000.00</u>

Complete this section only for a FINAL FINANCIAL STATEMENT which shows a balance in the grant account.

The balance in the grant account will be liquidated

☐ By refund of unspent and uncommitted funds. The check should be drawn to the order of American Chemical Society - The Petroleum Research Fund, and identified by the number of the grant.

☐ By use in the completion of the grant project. We hereby request approval by the American Chemical Society of an extension of the grant agreement, without commitment of additional funds until _____, (period up to one year, renewable). Note: Term of Grant has been extended to 8/31/77.

We certify that the expenses reported herein were incurred for education and research in accord with the terms of the approved ACS-PRF grant-in-aid.

Georgia Institute of Technology
(Grantee Institution)

By C. Evan Crosby, Associate Director
of Financial Affairs
(Financial Officer)

March 16, 1977
(Date)

Edward M. Burgess
(Name of Principal Investigator)

7154-AC1
(PRF No.)

*** Please submit IN DUPLICATE to The Petroleum Research Fund -
American Chemical Society, 1155 Sixteenth Street, N. W.

GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GEORGIA 30332

OFFICE OF
THE
COMPTROLLER

November 8, 1978

The Petroleum Research Fund
American Chemical Society
1155 Sixteenth Street, N. W.
Washington, D. C. 20036

Gentlemen:

Enclosed in duplicate is the Annual Financial Statement for PRF No. 7154-AC1 and a Personnel Statement for co-worker receiving stipends from the grant covering the period September 1, 1977 through August 31, 1978.

If you have questions or desire any additional information, please let us know.

Sincerely,

David V. Welch, Manager
Grants & Contracts Acctg.

DVW/SS/bs
Enclosures

cc: Dr. E. M. Burgess
Dr. J. A. Bertrand
Mr. E. E. Renfro
Mr. A. H. Becker✓
File G-33-685

FINANCIAL STATEMENT

(Insert "Annual" or "Final", as appropriate)

AMERICAN CHEMICAL SOCIETY - THE PETROLEUM RESEARCH FUND

For the Period: 9/1/77 to 8/31/78
 (August 31 is the preferred closing date for the reporting period)

Balance Carried Over from Previous Reporting Period (from Same or Earlier Grant)	\$ 9,501.00
Received from PRF During Reporting Period	.00
Salaries to:	
Principal Investigator	.00
(Contribution Toward Summer Salary*)	
Graduate or Undergraduate Students	.00
Postdoctoral Fellows	\$ 4,120.80
	.00
Fellowships or Scholarships to:	
Undergraduate Scholars	.00
Graduate Fellows	.00
Postdoctoral Fellows	.00
Tuition	.00
Materials and Supplies	70.90
Equipment	.00
Computer Time Charges	.00
Travel	.00
Other Expenses	28.00
Departmental Supplement or Allocation*	.00
* If provided in grant agreement	
Total Expenditures During Reporting Period	\$ 4,219.70

Balance on Hand at End of Period	\$ 5,281.30
Total of PRF Grant Payments Received to Date	\$ 20,000.00

Complete this section only for a FINANCIAL STATEMENT which shows a balance in the grant account at the termination date of the current grant agreement.

The balance in the grant account will be liquidated

☐ By refund of unspent and uncommitted funds. The check should be drawn to the order of American Chemical Society - The Petroleum Research Fund, and identified by the number of the grant.

☐ By use in the completion of the grant project. We hereby request approval by the American Chemical Society of an extension of the grant agreement, without commitment of additional funds until _____, (Period up to one year, renewable - insert "Annual" above).

We certify that the expenses reported herein were incurred for education and research in accord with the terms of the approved ACS-PRF grant-in-aid.

Georgia Institute of Technology

(Grantee Institution)

David V. Welch, Mgr.

Financial Officer Grants & Cont. Acctg.

11/8/78
(Date)

Edward M. Burgess

7154-AC1

(Name of Principal Investigator)

(PRF No.)

** Please submit IN DUPLICATE to The Petroleum Research Fund,
 American Chemical Society, 1155 Sixteenth Street, N. W.
 Washington, D. C. 20036 **

PERSONNEL STATEMENT

PRF# T154-AC1 REPORTING PERIOD 9/1/77 TO 8/31/78
GRANTEE INSTITUTION Georgia Institute of Technology DEPARTMENT Chemistry
PRINCIPAL INVESTIGATOR(S) Dr. Edward M. Burgess
GRANT PROJECT TITLE "The Chemistry of N-Sulfonylamines and Thioamines."

List undergraduate, graduate, and postdoctoral co-workers receiving stipends under the above named grant:

NAME	TITLE OR ACADEMIC APPOINTMENT	PREVIOUS EDUCATION & DEGREES*	COUNTRY OF PERMANENT RESIDENCE	PERIOD OF SUPPORT (MONTHS)	PERCENT OF SUPPORT FROM PRF	DEGREES RECEIVED (IF ANY) DURING REPORTING PERIOD
Toshiaki Yoshimura	Postdoctoral Fellow	Osaka Univ.	Japan	5	42%	
Piara Singh	Postdoctoral Fellow	Univ. of New Orleans	United States	1	8%	

List other co-workers on grant project not directly supported with ACS - PRF funds:

NAME	SOURCE OF SUPPORT	DATES ASSOCIATED WITH GRANT PROJECT

* For graduate students, indicate the College or University attended prior to graduate work. For postdoctoral fellows, give the name of the Ph. D. granting institution.

G-35-67

GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GEORGIA 30332

OFFICE OF
THE
COMPTROLLER

November 6, 1979

The Petroleum Research Fund
American Chemical Society
1155 Sixteenth Street, N.W.
Washington, D. C. 20036

Gentlemen:

Enclosed in duplicate is the Annual Financial Statement for PRF No. 7154-AC1 and a Personnel Statement for co-worker receiving stipends from the grant covering the period September 1, 1978 through August 31, 1979.

If you have questions or desire any additional information, please let us know.

Sincerely,

David V. Welch, Manager
Grants & Contracts Acctg.

DVW/SS/bs
Enclosures

cc: Dr. E. M. Burgess
Dr. J. A. Bertrand
Mr. E. E. Renfro
Mr. O. H. Rodgers
File G-33-685

ANNUAL FINANCIAL STATEMENT
(Insert "Annual" or "Final", as appropriate)

AMERICAN CHEMICAL SOCIETY - THE PETROLEUM RESEARCH FUND

For the Period: 9/1/78 to 8/31/79
(August 31 is the preferred closing date for the reporting period)

Balance Carried Over from Previous Reporting Period (from Same or Earlier Grant) \$ 5,381.30

Received from PRF During Reporting Period .00

Salaries to:

Principal Investigator \$.00

(Contribution Toward Summer Salary*)

Graduate or Undergraduate Students 626.00

Postdoctoral Fellows 3,958.30

.00

Fellowships or Scholarships to:

Undergraduate Scholars .00

Graduate Fellows .00

Postdoctoral Fellows .00

Tuition .00

Materials and Supplies 697.00

Equipment .00

Computer Time Charges .00

Travel .00

Other Expenses .00

Departmental Supplement or Allocation* .00

* If provided in grant agreement

Total Expenditures During Reporting Period \$ 5,281.30

Balance on Hand at End of Period .00

Total of PRF Grant Payments Received to Date \$20,000.00

Complete this section only for a FINANCIAL STATEMENT which shows a balance in the grant account at the termination date of the current grant agreement.

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By use in the completion of the grant project. We hereby request approval by the American Chemical Society of an extension of the grant agreement, without commitment of additional funds until _____, (Period up to one year, renewable - insert "Annual" above).

We certify that the expenses reported herein were incurred for education and research in accord with the terms of the approved ACS-PRF grant-in-aid.

Georgia Institute of Technology

(Grantee Institution)

By David V. Welch, Mgr.,
(Financial Officer) Grants & Cont. Acctg.

11/6/79
(Date)

Edward M. Burgess

7154-AC1

(Name of Principal Investigator)

(PRF No.)

** Please submit IN DUPLICATE to The Petroleum Research Fund,
American Chemical Society, 1155 Sixteenth Street, N. W.
Washington, D. C. 20036 **

PERSONNEL STATEMENT

PRF# T154-AC1 REPORTING PERIOD 9/1/78 TO 8/31/79

GRANTEE INSTITUTION Georgia Institute of Technology DEPARTMENT Chemistry

PRINCIPAL INVESTIGATOR(S) Dr. Edward M. Burgess

GRANT PROJECT TITLE The Chemistry of N-Sulfonylamines and Thioamines

List undergraduate, graduate, and postdoctoral co-workers receiving stipends under the above named grant:

NAME	TITLE OR ACADEMIC APPOINTMENT	PREVIOUS EDUCATION & DEGREES*	COUNTRY OF PERMANENT RESIDENCE	PERIOD OF SUPPORT (MONTHS)	PERCENT OF SUPPORT FROM PRF	DEGREES RECEIVED (IF ANY) DURING REPORTING PERIOD
Toshiaki, Hoshimura	Postdoctoral Fellow	Osaka Univ.	Japan	5	42%	
McGraw, Earl C. Jr.	Graduate Research Asst.	Wofford B.S./College	U.S.A.	2	40%	

List other co-workers on grant project not directly supported with ACS - PRF funds:

NAME	SOURCE OF SUPPORT	DATES ASSOCIATED WITH GRANT PROJECT

* For graduate students, indicate the College or University attended prior to graduate work. For postdoctoral fellows, give the name of the Ph. D. granting institution.